

The LAMP H- ion sources: goals, status, and plans

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What is LAMP?

- Upgrade of front end of the LANSCE accelerator, from 0-100 MeV (ion sources – DTL tanks)
- Includes H+ and H- ion source and injector
- Anticipated LAMP installation date: January 2032
- LAT is a full subsystem test that will include everything in LAMP from the ion sources to the first DTL tank (~0-9 MeV)
- Anticipated LAT install start: January 2027

Ion Source Requirements

- Driven by preliminary design (anticipated completion date October 2027)
- Pulsed H- ion source:
 - 120 Hz total rep rate
 - 20/120 Hz to Lujan
 - 100/120 Hz to WNR
- Different peak current requirements due to downstream average current limitations

Parameter	Value
Peak Current (Lujan)	16 mA
Peak Current (WNR)	55 mA
ϵ_N^{RMS} Lujan (μm)	.14
ϵ_N^{RMS} WNR (μm)	.19
Plasma Pulse length	1 ms
Duty Factor	12%
Lifetime	12 weeks
Replacement Time	12 hours

Table 1: Ion source parameters for the current conceptual design

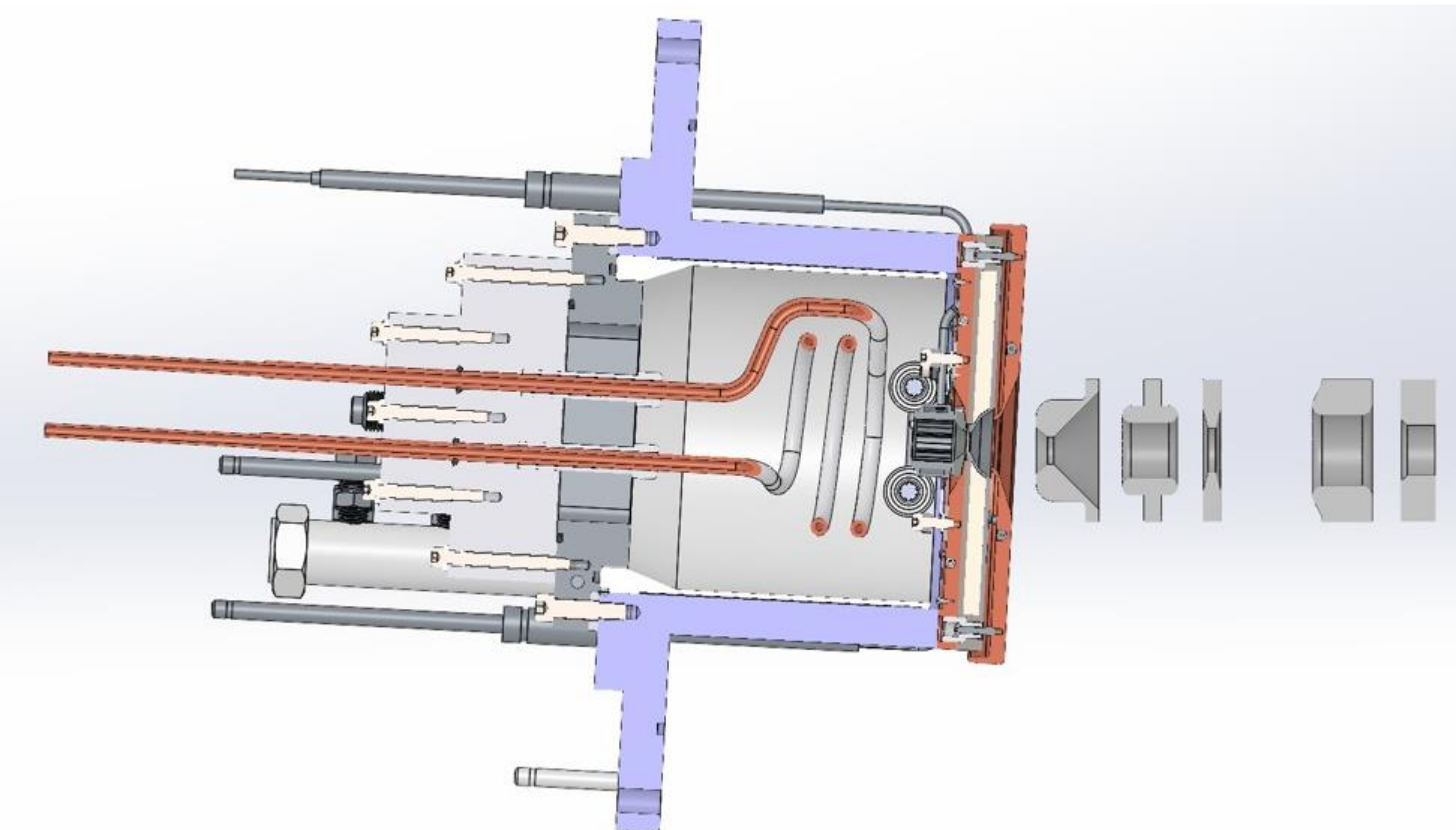


Figure 1: Model of the H- ion source and injector electrodes for the conceptual design

Ion Source Design

ION SOURCE

- SNS style RF ion source will be used
- Initial goal is to change as little as possible to reduce commissioning time
- Some changes may be needed due to requirement for high duty factor and high total extracted charge between ion source replacements

INJECTOR

- 65kV injector (both H- and H+)
- Design inspired by SNS and LEDA designs
- (at least) 2 electrodes are pulsed to improve beam transport with 2 different peak currents
- remainder of LEBT does NOT change with beam current

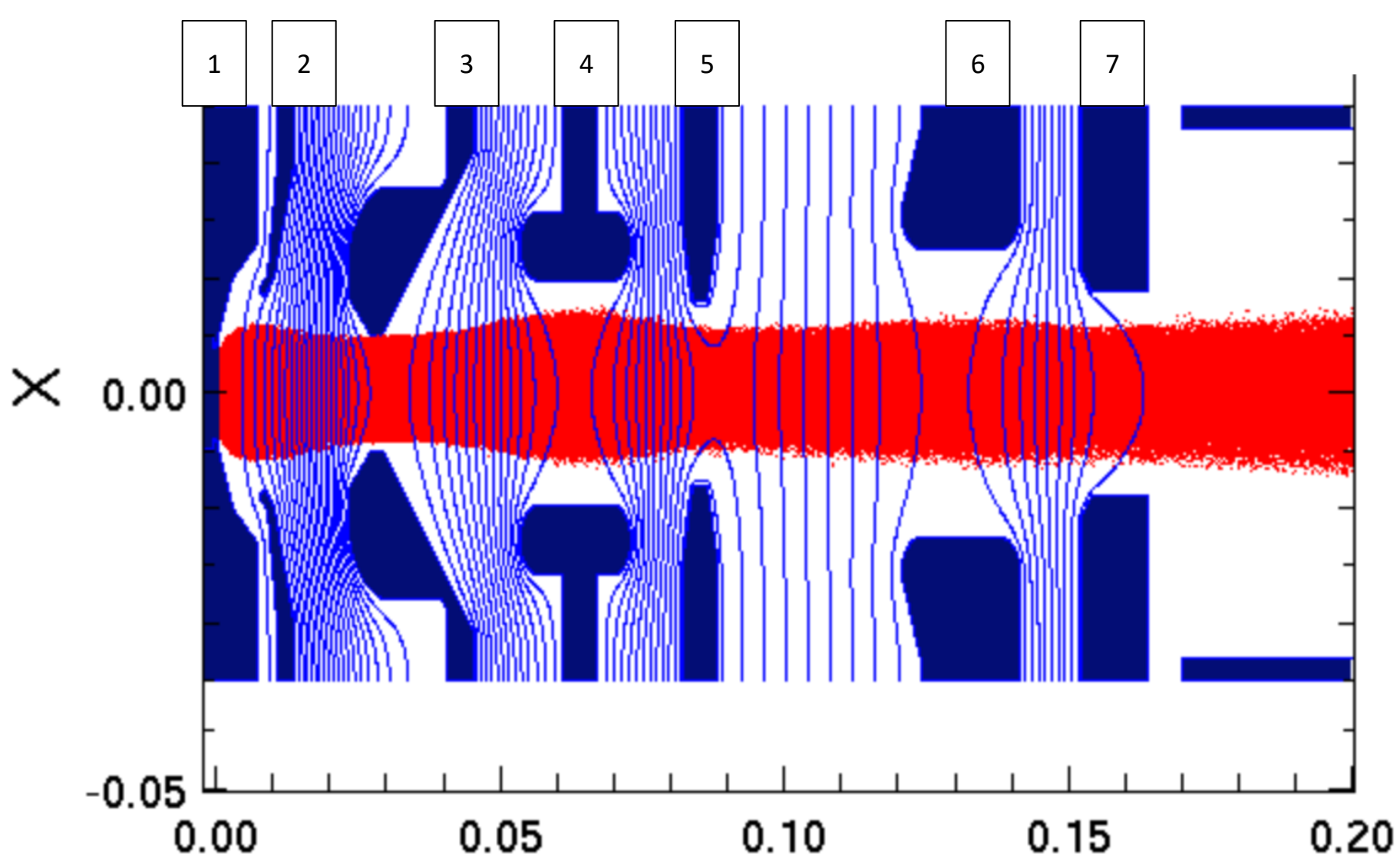


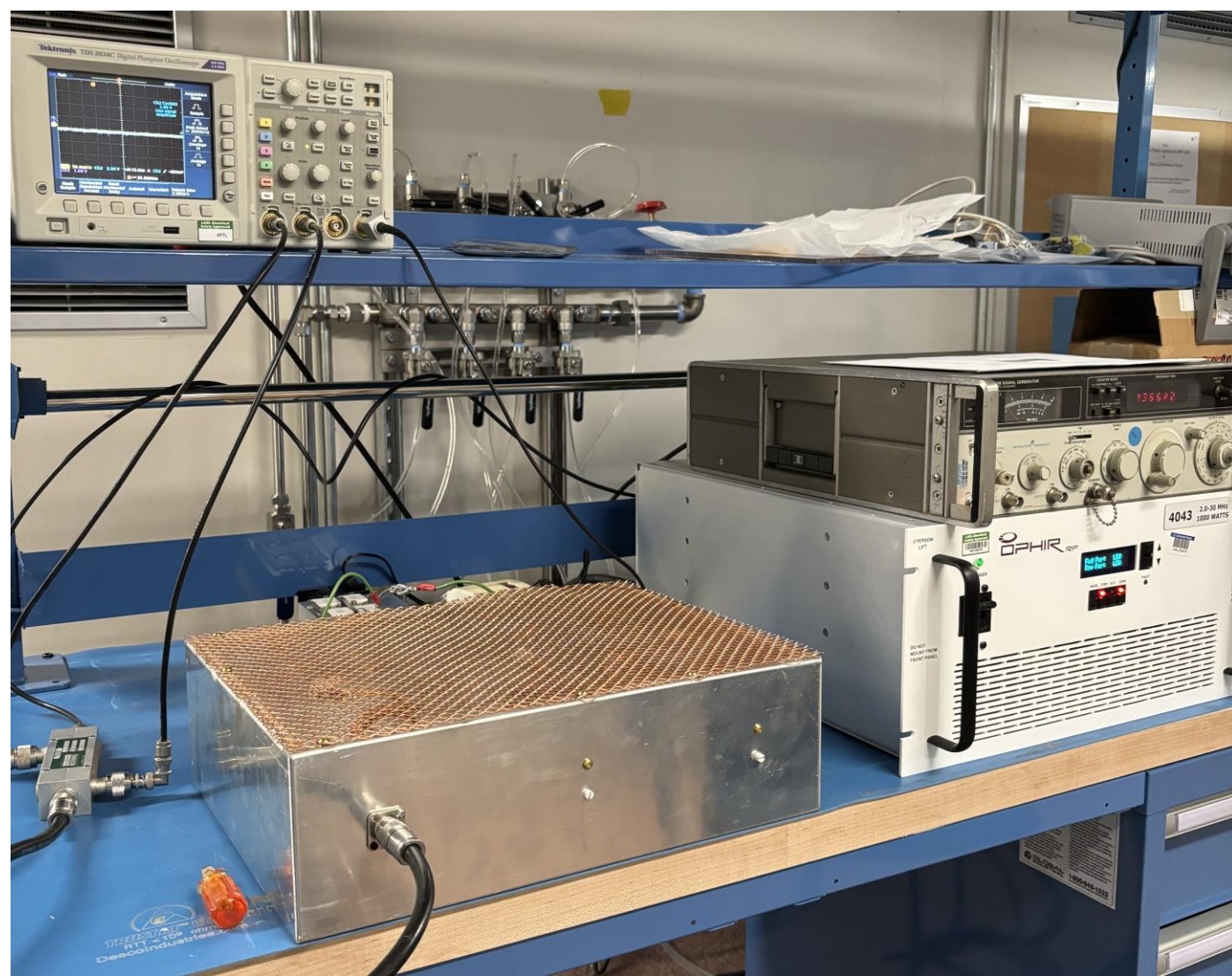
Figure 2: Schematic of the injector with beam parameters simulated for the WNR beam in WARP

Electrode	Voltage
1 (Pierce)	-65 kV
2 (E-dump)	-58.8 kV
3 (Extractor)	+6 kV
4 (Einzel A)	-41 kV (WNR)/ -48kV (Lujan)
5 (Ground A)	0 kV
6 (Einzel B)	-30kV (WNR)/ -45.3 kV (Lujan)
7 Ground B	0 kV

Table 2: Injector Voltages. Pulsed voltages are in red

Ion Source Status RF

- Successful test of 13 MHz system with matching network
- Commissioning of 2 MHz source and matching network in progress



PLASMA

- Argon plasma testing at 13 MHz in progress
- Hydrogen testing pending final approvals for system

Ion Source Future Plans

- Plasma testing: October 2026
- Injector design completion: December 2026
- Injector assembly and testing: April 2027
- Ready for LEBT testing: January 2028